KIMS HOSPITALS™

NEWSLETTER ON WELLNESS

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TALK TO YOUR BABIES A LOT...

Editor's Desk

Dear Reader,

Let me first wish you a healthy and happy new year..

Welcome to our fourth newsletter on wellness titled **"Talk to Your Babies a Lot",** a crucial subject which is frequently ignored.

The first 1000 days (from conception to age 3) constitute an important phase in human life since 80% of brain development happens during this period. We all know nutrition plays a very important role in healthy brain development. While nutrition is physical, there is, literally, vocal input that is equally important in igniting and improving brain development in a child. While genetics provide the initial framework for development, it is every day vocal and emotional experiences that shape a child's brain.

Simply put, **talk to your babies** more to continuously stimulate their brains, as babies are born "Ready to Learn" and have the capacity to learn a variety of abilities over the first 1000 days.

We sincerely hope that this information will be helpful to you in fostering and nourishing your child's brain development.

We thank our readers for their continuous appreciation and support which is indeed invaluable. Our endeavor is to bring you such articles that will enrich your wellbeing in a myriad ways.

Once again, best wishes for the New Year.

Dr. Bhujanga Rao Vepakomma
Chief Editor

Are we talking to the newborns enough? It is this question we are going to address in this newsletter. We will attempt to unravel the implications of this crucial aspect of child rearing. It mainly focuses on the brain development of babies from the prenatal period to age 3, the amazing power of their brains, and what parents or baby caretakers can do to make them function better.

What the scientists, parents, caregivers want to know about babies for long!

- Does the foetus in the womb hear the mother's voice and recognize it as a significant sound?
- Does a child below the age of 3 who experiences more conversation in the first 3 years have greater brain activity and verbal aptitude?
- Is the child's brain development in the first three years strongly influenced by the child's interactions with other people and the world?
- How important is it for the child and parents to engage in continuous conversation from birth?
- How many languages can a child learn simultaneously?

When we say "baby" or "a tiny tot," we mean an infant (0 to 12 months) or a toddler (1 to 3 years) who is below the age of 3 years. As babies, they are smarter and more intelligent than we think. Babies are more attracted to sounds even while in the womb, which continues up to the first few months of life, while they cannot focus on colours as much until about six months of age. Hearing is considered more important than seeing for a baby's development. This is the reason that experts say 80 percent of all communication with newborns comes from sound rather than sight. We know babies cry a lot. It is their way of intelligently communicating to their mother or carer that they need something like a diaper change, are being cuddled by an unknown person, are hungry, or are in pain. By eight months of age, the baby knows how sounds are connected to objects and actions. Though they do not have language skills yet, they have the ability to learn new words and understand simple concepts. Babies learn about word meanings through conversations with caretakers or parents before they can read for themselves. Babies grasp more from conversation than children, who get most of their information from books. The message from this newsletter is that, if you want to help your child develop in all respects, talk to your baby a lot!

30 MILLION WORD GAP

For quite a long time, we have been under the impression that economic disparities affect mainly standards of living, primarily food, clothing, and shelter. But there are other areas that are distressingly impacted where it has nothing to do with money. The tiny tots from lower-income groups are deprived of an essential part of mental growth, largely due to the ignorance of their parents or their preoccupation with making both ends meet. In spite of some improvement in economic standards, there exists a cultural gap that needs to be addressed to make parents cognizant of this important aspect of child rearing.

Although the research says that it is the economically backward families that are affected, it could be true, may be to a lesser extent, in affluent sections as well.

The nuclear family is the present-day norm. Earlier, there used to be grandparents, uncles, and aunts in a family setup, and they used to take care of the kids, talking to them all along. Nowadays, children are left in the care of daycare centers, where such intimate care and talk is not possible. Parents return home exhausted and stressed, and as a result, they spend less time with their children.

Many parents take delight in the fact that their one-year-old kid operates the smart phone all on its own. Some toddlers are left to watch TV for hours. Is it a substitute for parental talk? Do they know how much the child is missing out?

We are going to examine in detail the crying need to speak to the children more and more.

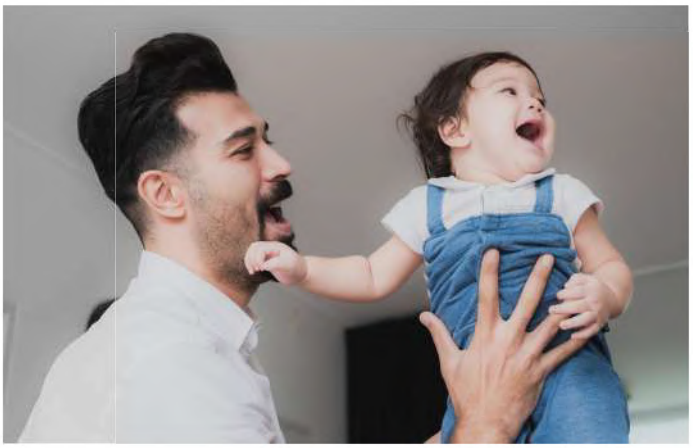
A startling discovery was made about three decades ago by American psychologists Betty Hart and Todd Risley - what they described as a "30 million word gap." It was estimated by them that children from lower-income families heard a staggering 30 million fewer words compared to babies born in higher-income families, and this difference has a direct bearing on the brain development of the child. This study had set the alarm bells ringing, and there have been many awareness campaigns ever since in countries

like the US to drive home the point that a child from an affluent family will experience 30 million more words within the first four years of life than a child from a lower income group.

The number of 30 million is disputed, but the point that a child who is talked to more, fares better than the rest is well taken. There are two issues. One, there is a link between brain activity and parental communication with their children.Second, low-income families speak fewer words.Our coverage is mainly on the first aspect because the problem can persist in all kinds of families—rich and poor. The need is to talk more and more to the child in the first four years of its life.

The point we want to make is that a child has to be talked to in its early days, regardless of the background. It may be possible that the same syndrome can exist in well to do families due to various factors. In the nuclear family setup, where both parents are working, there may not be much talk taking place between the tender child and busy parents.

The central point is the correlation between brain activity and speech input. We will dwell on what parents ought to be doing without embarking on class, culture, or income divisions.



The American survey was conducted on a small group. The point is that the observation may not be necessarily confined to low income families. In affluent families also it can happen. So, the loud and clear message is: *Talk to your babies a lot and lot while eliciting response.*

What do research studies reveal?

Studies were also conducted at Harvard University, MIT, and the University of Pennsylvania to determine whether the number of words really matters.A study they published in the journal Psychological Science concluded that young 4-, 5-, and 6-year-olds who participated in more conversation at home showed greater brain activity, and this effect was carried over when they were listening to a story and processing language in the classroom.

What they found is that the mere language—the number of adult words, was not related to brain activation or verbal skills. But what was strongly related was the amount of back-and-forth conversation between babies and adults. This is a very useful finding with practical applications.

Back-and-forth conversation is important because it helps to rewire the brain through synapses and cause it to grow and develop. Scientists call this neuroplasticity. Children who experienced more conversation at home showed increased brain activity and verbal abilities. The benefits of conversation were equally good for low-income children as well as for high-income children. Research also revealed that children who indulged in greater amounts of conversation performed 12 percent better on standardised language evaluations.

But the tendency to experience far less conversation at home is found to be high among low-income children. This is not good at all. On average, a child from a high-income household had 50 more conversational turns in an hour compared to a child from a low-income household. Here, the word “turn” is used to convey a to and from conversation between an adult and a child. One cannot simply ignore the implications of this phenomenon, as it has a great social, economic, and psychological impact.

Is it not necessary to design programmes aimed at low-income mothers to make them understand the importance of talking to babies from birth? The lesson is that no child shall remain disengaged. Engage them verbally or playfully every time, eliciting a response verbally or emotionally. Back-to-back conversational episodes are more important than the number of words.The more, the merrier. Here, it is to be appreciated that Hart and Risley’s 30-million-word-gap study never made the only point that quantity was important. Sometimes it will be difficult to know how to converse with a few-month-old infant. There are methods of engaging with the infant too. With infants, play a peek-a-boo game, which is as good as a conversation because the child responds with chuckling cheeks.

Peek a boo means I see you! It is a simple but classic game played all over the world. Every time you play, it rewires your baby’s brain and continues to create new brain cell connections in multiples.According to scientists, this enjoyable game improves eye contact, gross motor skills, visual tracking, is the best way to laugh and learn, foster trust that there is always someone there to care for you, and causes different neuronal pathways in the brain to begin to open.

Playing peek-a-boo, making silly faces, or the pat-a-cake game can all lead to back-to-back conversations.Let us realise that no baby is too young to play. There are many such “baby’s first games” all over the world. The funny gestures that go along with these games make the

difference. It is less difficult than long narration by parents.

As the baby grows, parents who engage in regular, continuous conversation are exposing their babies to more vocabulary and grammatical intricacy, which tends to produce more verbally skilled kids.

Another detailed scientific study on this subject employing the latest monitoring equipment was carried out at MIT laboratory on selected children to measure their verbal and reasoning skills. When the researchers matched the children's test results and brain scans in the lab with the audio patterns at home, they discovered that a child's verbal test score rose by one point for every 11 conversational rounds..

And they observed that for kids who had more communication at home, the area of the brain imaging associated with language processing lit up more.

This neuroscience study also confirms the findings of psychologists Hart and Risley's seminal study, which was conducted without the use of brain scans.

Babies brain development in the first 3 yrs.

An astonishing amount of brain development takes place during the first three years of a child's life. Early years with significant 'wiring' occurring within the brain effectively programme the child's development, laying the foundation for the rest of their lives.

A baby's brain will start developing connections between what they see, hear, taste, and feel during the first nine months of life. A baby will become more vocal between the ages of 9 and 12 months as their capacity for comprehending emotions grows. The most number of brain connections (synapses) a kid will ever have is roughly 1,000 trillion by the age of three, as they are "pruned" in subsequent development..

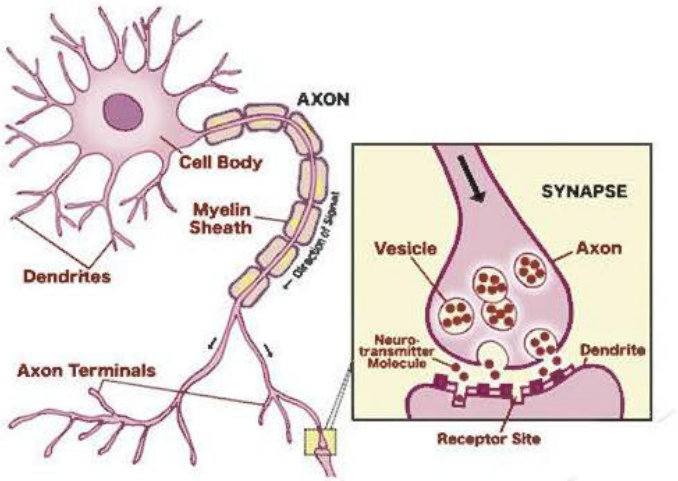


Figure 2: Adapted from www.educarer.org

The speed of messages sent by neurons from different parts of the body to the brain can exceed 150 miles per hour!

Communication and coordination between different parts of the body take place with the help of neurons, which transmit information in the form of chemical and electrical signals.

Rapid advancements in the field of neuroscience are revealing new and amazing truths about the stages of child brain development.

The baby's brain at birth is only 25% the size of an adult brain. Judith Graham of the University of Maine Cooperative Extension reports that a baby's brain contains about 100 billion neurons at the time of birth, which are sufficient for the rest of life. The unwired neurons at the time of birth begin to make connections with one another as the brain starts learning more and more.

Synapses are the brain connections that join axons at the end of a neuron's tail to another neuron's dendrite to support the passage of electrical signals through them. Synapses that are rarely used for neuronal activity remain weak and are eventually discarded by the brain by pruning.

Synapse Density Over Time

Figure 1: Adapted from Corel JL., Harvard University Press (1975)

In a child's growth, parents, caretakers, and other family members are crucial. The early development, educational chances, and social experiences of your child are greatly influenced by the safe, nurturing environment you provide for them as well as by the time you spend chatting, reading, and playing with them.

A newborn baby is not a blank slate, as many people believe!

We believe that a newborn baby is a blank slate that must be filled from the ground up.Surprisingly not. Don't think that a baby knows nothing. By the time a newborn is born, it has had extensive exposure to the outside world. In particular, newborns seem to react to sounds during the foetal period and respond distinctly to them after birth. For example, newborns seem to recognise familiar environmental sounds and melodies from the prenatal environment, discriminate between the mother tongue of the mother and other languages, and recognise the mother's voice from the voices of others. It was suggested

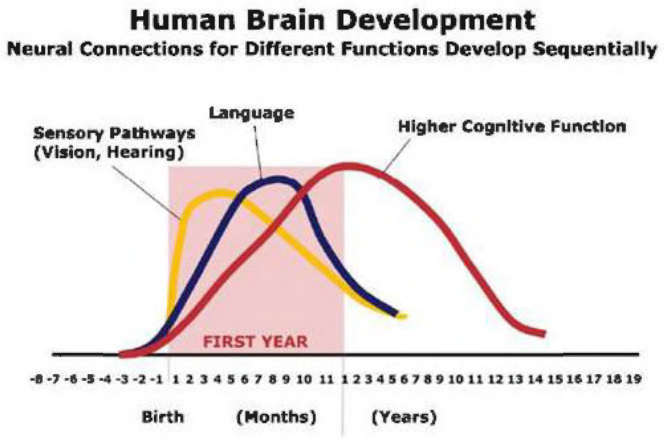


Figure 3: Adapted from C.A. Nelson (2000)

that prenatal learning facilitates, for example, language learning in infancy and provides a basis for motherly attachment.

When external auditory input begins to reorganise the auditory cortex, foetal auditory learning becomes possible soon after the onset of hearing, in humans by the 27-week gestational age.It was initially thought that foetal auditory learning was limited to low-pitch sound features, such as music rhythm and prosodic features of speech, because external high-pitched sounds are attenuated in utero.

Research studies show that prenatal exposure to external music can have long-term plastic effects on the developing brain and enhance neural sensitivity to the sounds used in the prenatal period. The effect of prenatal exposure lasts for at least four months without any extra stimulation, proving that these plastic alterations are long-lasting. These discoveries have a number of real-world applications. First, it makes sense that the unfavourable prenatal sound environment can also have long-lasting negative impacts as the prenatal auditory environment influences the neural response of fetuses. Such environments include noisy workplaces and, in the case of preterm infants, neonatal intensive care units, etc. Furthermore, because prenatal exposure continued to affect ERP (event-related potential) responses months after birth, additional foetal exposure to structured sound environments may be beneficial for supporting the auditory processing of infants at risk for dyslexia whose basic auditory processing has been shown to be impaired.

First, it makes sense that the unfavourable prenatal sound environment can also have long-lasting negative impacts as the prenatal auditory environment influences the neural response of foetuses.

Foetal development and hearing

A woman, as her pregnancy proceeds, inadvertently communicates with her developing fetus. Some may sing lullabies or read stories, while others listen to classical music to boost the brain development of the foetus. (Though there is no evidence that classical music will rewire connections and boost brain development.)

During the second month of pregnancy, the formation of the baby's eyes and ears begins. Around the 9th week, telltale markings of ear formation can be seen on each side of the baby's neck.Then begins the baby's journey of learning to hear all sounds while still in the womb. While 18 weeks pregnant, the baby developing in the womb will hear its first sounds. With each passing week, the baby's ears will become more sensitive to sound.

The heartbeat, lungs' airflow, a grumbling stomach, and even the sound made by blood flowing via the umbilical cord are all examples of sounds that can be heard in a mother's body. The babies become accustomed to these noises, which makes it easier for them to adapt to their postpartum surroundings.

As the pregnancy progresses to the 25th or 26th week, the baby in the womb starts responding to the sounds of voices and other noises inside and outside the womb. This is confirmed by sound recordings taken in the uterus. It is also recorded that the intensity of sound from outside is reduced by half because there is no open air in the uterus. There is air outside the womb.The womb is a fluid environment. The baby in the womb is surrounded by amniotic fluid and the layers of the mother's body, due to which all noises from outside are filtered.

Baby will hear his mother's voice louder than any other. That's because the sound of her voice reverberates through her body when she speaks. Research has shown that babies in the womb become alert when they hear their mother's voice when she is talking or reading aloud. The baby can even recognise the mother's voice while in her third trimester. They even analyse the tone of the voice they hear—is the voice happy or upset? A recent study showed that cortisol levels of babies in the womb rose when their mother spoke in a harsh, raised voice, indicating the level to which the brain's hearing faculty had developed. Sounds the baby hears in the womb not only contribute to hearing but also lead to brain development, which will continue even after the baby's birth. Parents at this stage don't need to do anything special to facilitate this. They are more alert while their mother is speaking and respond with an increased heart rate. In the great Indian epic Mahabharat, we heard the story of Prince Abhimanyu in the womb learning about Chakravyuha, a war strategy, when his father, Lord Arjuna, was narrating it to his mother, Subhadra. Thus, the concept of a child being able to hear from the mother's womb has existed since time immemorial.

Can loud noises hurt an unborn baby?

While loud sounds can cause harm to the hearing while loud sounds can cause harm to the hearing mechanism or the brain of the baby in the womb, softer sounds will provide some benefit. Exposure to pleasant music played at 70 decibels or lower can be soothing to both mother and baby. Avoid listening to high-pitched music at any volume because animal studies have shown that it causes changes in brain structure in foetuses.Because the impact of music on unborn human babies has not been well-studied, the full impact of sound on foetuses remains unknown.

Loud noises can come from a variety of sources, like community celebrations playing loud low frequency music, aircraft engine noise in airports, rock concerts, a high-volume TV speakers, among others. While avoiding loud noise levels is understandable, it doesn't necessarily mean sticking to a completely silent environment since stimulation by soft sounds actually benefits the unborn baby.

Safe Levels

Research carried out showed that sounds less than 80 decibels should not cause hearing damage, according to the Children's Hearing Institute, USA. For comparison's sake, one can assume that this is equivalent to noise levels produced in a busy restaurant or in a dense road vehicular traffic region. A normal conversation between two people or a small group is about 60 dB.

However, because of the presence of amniotic fluid inside the uterus, most sounds do not harm the foetus because sound travels at the same frequency in fluid as it does in air.But still, it is not good to expose the foetus to prolonged and repetitive noise as it may prove danger`ous to the foetus.

Would a child listening to radio or TV help his brain develop?

Well, babies are born knowing a lot, but they also learn a lot, and they learn a lot even when they're very little babies. A healthy baby lifestyle recommendation is (TOI April 25, 2019/WHO report).

Ages 2 to 4: one hour of sedentary screen time/day
Ages 0–1 should not be exposed to screen time.

Sedentary screen time includes things like watching TV, watching videos, and playing computer games.

The first three years of a baby's life are characterised by rapid physical and cognitive development, during which habits are formed and family lifestyle routines can be adjusted. Developed through hundreds of studies in Australia, Canada, the United States, and South Africa babies ages 1-4 should engage in at least 3-4 hours of physical activity per day.Infants under one should interact with floor based play and avoid all screens.

As stated earlier, talking to babies boosts their brain power. Systematic surveys revealed that those babies whose parents converse with them least performed worse in language tests, lagging behind by up to six months for the same age group. Similarly, when babies and toddlers are exposed to varying degrees of conversation, it is discovered that striking differences exist in their vocabularies and language processing skills over the course of 18 months.

What happens when we deprive a baby of interaction?

When a child is deprived of complete external audio or visual stimulation, it is found that the child's neuronal growth is radically reduced, to its disadvantage. From an evolutionary standpoint, it is a separate story that the infant adapts to the physical and emotional environment it is born into to ensure its successful survival. It is like a baby, for example, who is raised in the dark and loses the retinal cells that detect colour even if they are born with normal eyesight. The most significant life events for babies and small children are ordinary activities that take place daily and repeatedly. Early childhood is the life phase when patterns are "hardwired" into our behaviour and those brain connections that are used more frequently become the settled pathways that sensory signals take more readily. It is well established by various studies that such development is most intensive within the first thousand days, slowing within five years, and still continuing to develop afterwards but at a much slower pace. Herein lies the importance of the first 1000 days in human brain development.

Magic of Music

When we listen to music, the vibrations or sounds that make up the sound travel through our bodies, changing both our physical and emotional landscape. Researchers found that listening to music or singing stimulates the release of endorphins, the brain's "feel good" chemicals, as well as other hormones like oxytocin, also known as

the “love” or “cuddle” hormone. Compared to children who merely listened to songs, one-year-old babies who participated in music classes for a sufficient amount of time while singing and playing musical instruments in time with the adults performed better in communication, the visual expression of happiness, and sensible brain responses to music.

It is now accepted that music instruction accelerates brain development in babies, which is responsible for processing sound, speech perception, language development, and reading skills. This is based on the results of a five-year study by USC neuroscience experts.

The scientists in this study have compared the baby musicians with peers in two other subject groups, involving 11 children in a community soccer program, and 13 children not involved in any specific after-school programs. As part of these studies, the children were asked to learn to play instruments, such as the violin, in ensembles and groups, and participate in practise for up to seven hours a week.

The neurology scientists collected and processed brain signals using several scanners and monitors as the children grew, such as MRI to monitor changes through brain scans, EEG to track electrical activity in the brains, behavioural testing, and other techniques as well.

The neuroscientists discovered a positive difference in the auditory systems of children in the music programme within two years of the study, such as their maturing faster than the other children’s.They felt fine-tuning their auditory pathway using such music programmes could accelerate their development of language and reading, as well as other abilities. The enhanced maturity observed is due to an increase in neuroplasticity in the brain due to exposure to music and music instruction.

Researchers have found that musicians’ brains and behaviours differ from those of non-musicians over the past 20 years.

It has been discovered that music training is associated with improved linguistic and mathematical abilities, a higher IQ, and overall stronger academic accomplishment. Additionally, it has been discovered that parts of the brain associated with hearing and movement, among other things, differ between musicians and non-musicians.

For a child, observing a pianist at a recital, moving his fingers gently on the piano, pressing the keys using both hands, and producing music notes, will be an exciting emotional experience.

Brain regions that perceive the sensations of hearing, sight, and motor cortex responsible for complex movements work in a coordinated symphony to produce melodious music. This needs both hands in action while connecting emotionally with other players and the audience to create the magical effect.

Such activities hardwire the brain connections of different lobes and stimulate the brain’s functions.

(Source: Emily Gersema) June 20, 2016; the authors of the study were BCI neuroscientists)

Can a child learn two or three languages at the same time? How many languages can a child learn?

These are common questions generally asked by parents who want to raise their children bilingually or even multilingually. With globalization, it has become common for people to live in different countries, and there is a requirement to speak different languages. Mother speaks Telugu, father speaks Italian, and English is the medium of instruction in school.Some parents think that the child will get confused if we teach all languages at the same time at that age. But in reality, children will have no problem learning three languages with ease. Its brain is fully capable of handling all three languages. The child can speak all three languages fluently if he is taught.

What we understand is that children can learn multiple languages at once. In fact, it is not unusual for a child to learn multiple languages, and it is more common than most people think.

TAKE HOME

Babies are born ready to learn, and they easily develop many skills during the first 3 years. They depend on parents, uncles, aunts, close family members, friends, and carers as their first teachers to develop and sharpen the right skills to become independent and lead successful lives. This happens since parents and other carers can support healthy brain growth through continuous interaction like cuddling, talking, playing, and caring for their children at all early stages of life.

Children learn best when these teachers take turns deeply engaging and building on their child's skills and interests. Engaging with children and exposing them to varieties of toys, games, puzzles, books, stories, and songs helps strengthen children's language, vocabulary, and communication, which enables them to learn better and faster and succeed in school. Caring for the children by understanding their needs and supporting their actions helps to protect the children's brains from stress while, on the other hand, stimulating brain growth. The mantra for all parents, caregivers, and anyone else dealing with a baby is to talk to them frequently, especially during the first 1000 days after birth.

Consider that continuous conversation with the baby child is essential for its future in building self-control, management skills, generosity, confidence, communication, problem solving etc. in addition to what genes bestow upon you.

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We wish all our readers and their families

Happy new year *& Sankranthi*

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